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Has urban economic growth in Post-Reform India been pro-poor between 1993-94 and 2009-10?

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Abstract:

This paper empirically tests whether urban economic growth has been pro-poor in the post reform India. The study uses data from the three rounds of quinquennial household survey of urban monthly per capita consumer expenditure (MPCE) carried out by National Sample Survey Organization (NSSO) in 1993-94, 2004-05, and 2009-10. To empirically measure the pro-poorness of urban economic growth, this paper uses the framework developed by Duclos (2004) and also follows the methodological approach of Araar, Duclos, Audet, and Makdissi (2007, 2009). The study finds strong statistical evidence that India's urban economic growth has been absolutely pro-poor but relatively anti-poor between periods 1993-94 - 2004-05, 2004-05 - 2009-10, and 1993-94 - 2009-10. The results indicate that more effective distributive policies are urgently required for urban poverty reduction in India.

Key Words: Pro-poor Growth, Poverty, Inequality, Urban India

JEL Classification: D63, D64, R11

* Any opinions expressed here are mine and not necessarily those of the institute. The usual disclaimer applies.

1. Introduction

Economic reforms in India which started on 24 July 1991 have had a significant effect on India's economic growth. For instance, India's average gross national product at 2004-05 prices grew at the impressive annual rate of 6.96 percent from 1992-93 to 2001-02. However, the real challenge faced by the Indian economy is the equitable distribution of the gains from higher economic growth to the citizens of India as benefits of growth are not equitably spread across different income groups and various sections of the society currently. In other words, low income groups (or lower caste) have benefitted only marginally or not much from the higher economic growth. For that reason, The Approach Paper to the Twelfth Five-Year Plan (2012-17) has chosen 'faster, sustainable and more inclusive growth' as its main goal. The thrust in the Approach Paper is to make growth 'more inclusive' in terms of providing more benefits to those sections of population, which had hardly benefitted from the higher economic growth achieved in post-reform India.

India's urban economy too is growing and making a sizeable contribution to the country's national income. The latest available Central Statistical Organization (CSO) data shows that in 2004-05, the share of urban NDP was about 52.02 percent in the national NDP, which is quite higher than the NDP (37.65 per cent) in 1970-71.¹ The compound annual growth rate (CAGR) of urban NDP was about 8.1 per cent from 1993-94 to 2004-05 at constant prices (1999-00). Most importantly, according to the Mid - Term Appraisal of the Eleventh Five Year Plan, the urban share of gross domestic product (GDP) which was about 63 per cent in 2009-2010 is projected to increase to 75 per cent by 2030. These figures show that the potential contribution of urban economic growth to national GDP is very high. At the same time, urban consumption inequality as measured by Gini coefficient increased from 0.34 in 1993-94 to 0.39 in 2009-10 -- an increase of about 15 per cent. On the other hand, urban poverty as measured by poverty head count ratio declined from 31.8 in 1993-94 to 20.9 in 2009-10 -- a decline of about 34 per cent. These inequality and poverty figures suggest that in spite of higher urban economic growth, a large proportion of urban dwellers are still experiencing inadequate improvement in their standard of living. In other words, higher urban economic growth is not shared equitably.

¹ Net domestic product (NDP) estimated at factor cost and its rural and urban break-up at national level are available only for the years 1970-71, 1980-81, 1993-94, 1999-2000 and 2004-05.

Poverty reduction is deemed an important goal of the country's urban policy. In India, migration is not a significant contributing factor in urban population growth; therefore, urban poverty does not constitute the transfer of rural poverty into urban areas. In the past, several Five Year plans had adopted several programmes and policies for urban poverty reduction. These include Nehru Rozgar Yojana (NRY) launched in October 1989 with the objective of providing of employment to the urban unemployed and underemployed poor; Urban Basic Services for the Poor (UBSP) implemented in Eight Five Year Plan (1992-97) for community organisation, mobilisation and empowerment and convergence through sustainable support system; Prime Minister's Integrated Urban Poverty Eradication Programme (PM-IUPEP) launched in November, 1995 for small towns development and the Swarna Jayanti Shahari Rozgar Yojana (SJSRY) operationalised on December 1, 1997 for gainful employment to the urban unemployed or underemployed poor by encouraging the setting up of self-employment ventures or provision of wage employment.

The Twelfth Five Year Plan (2012-17) has its focus on addressing the basic needs of the urban poor who are largely employed in the informal sector and suffer from multiple deprivations and vulnerabilities which include lack of access to basic amenities such as water supply, sanitation, health care, education, social security and affordable housing. Policy interventions like the Rajiv Awas Yojana (2013-22) proposed in Twelfth Five Year Plan, coupled with policy measures for augmenting the supply of affordable housing, and expanded access of subsidized healthcare and education to the urban poor, should result in a significant reduction in the proportion of slum dwellers as also the geographical spread of slums.²

However, for these interventions to bear fruit, a systematic appraisal of the higher urban economic growth and the associated distributive effects is imperative. It is important to know poverty figures as it is one of the essential inputs to design, monitor, and implement anti-poverty policies. However, little is known about the distributional aspects of this phase of urban economic growth and how it compares with the previous growth periods in terms of poverty reduction. Assessing the pro-pooriness of growth, and its consequences, has become a general

² See the following link for more details about the poverty reduction policies and programmes taken in different Five Year Plans in urban India. Web address:

<http://planningcommission.nic.in/plans/planrel/index.php?state=planbody.htm>

topic of policy discussion in several new development paradigms. It is also important to evaluate the distributional changes in the post – reform India, as rapid urbanization and urban economic growth are the main source of sustainable and higher economic growth. Now the question arises about how India should face the challenges thrown up by the rapid urbanization process, and what distributive policies need to be taken to ensure distributive justice and harmony in urban society. It is acknowledged that higher economic growth benefits the poor only when levels of inequality are lower and the gains of development are equitably distributed through appropriate redistributive policies.

The main objective of this paper is to empirically assess the pro-poorness of distributive changes of urban economic growth in post-reform India. In other words, it empirically investigates whether public policy and public expenditures are pro-poor or not. The study covers the period 1993-94 to 2009-10, and we have used available data from three rounds, i.e., 50th round for 1993-94, 61st round for 2004-05, and 66th round for 2009-10, of urban monthly per capita consumer expenditure (MPCE) data provided by National Sample Survey Organization (NSSO) for our analysis. For empirically measuring the pro-poorness of urban economic growth, we have used the framework developed by Duclos (2009) and followed the methodological approach of Araar et al. (2007, 2009) and Araar (2012). Duclos (2009) presents an axiomatic formulation of the two different approaches (i.e., relative and absolute) measurement of poverty. Broadly speaking, in the relative approach, we label a growth process pro-poor if the growth rate of the poor exceeds some standard (usually the average growth rate – of the median or the mean), e.g., are the poor growing at 5 percent? In the absolute approach, we label growth as pro-poor if the absolute incomes of the poor increase by at least some standard, e.g., have the incomes of the poor increased by Rs. 100? Araar et al. (2009) illustrate how we can statistically test for pro-poor growth. The novelty of using these frameworks is that it is based on a new theoretical framework and analyzes pro-poor growth in a dynamic manner, and has rigorous statistical rationale. The results are extremely important in the context of the ongoing debate about the distributional effects of the recent period of rapid urban economic growth experienced in India.

The rest of the paper is structured as follows. Section 2 presents a brief review of literature on measurement of pro-poor growth in India; Section 3 describes the measurement framework; Section 4 explains the data used for the empirical analysis and Section 5 highlights the details of

estimated results. Summary of findings, major conclusions and implications are provided in Section 6.

2. Review of literature

There are very few studies which measure the pro-poorness of economic growth in India. Datt and Ravallion (2009) assess whether the post-reform urban economic growth process has been more pro-poor than the pre-reform process. They measure pro-poor growth as reduction of poverty and elasticity of poverty with respect to economic growth.³ Using household consumption expenditure survey data from National Sample Survey (NSS) for the period 1958-2006, they have found that a long-run trend of decline in all three of the poverty indicators (i.e., Headcount index, Poverty gap index, and Squared poverty gap index), but higher proportionate rate of progress against poverty after 1991. Post-reform, growth process has become less pro-poor in the sense that the proportionate rate of poverty reduction from a given rate of growth was lower than in the pre-reform period. Finally, they find much stronger evidence of a feedback effect or trickle-down effect, i.e., higher reduction in rural poverty due to urban economic growth as than in the pre-1991 data.

Liu and Barrett (2013) using 2009-10 National Sample Survey data looks into the patterns of job-seeking, rationing, and participation under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). They find that the current administrative rationing of MGNREGS jobs is not pro-poor (i.e., “progressive” participation profile) but exhibits a sort of middle-class bias.

Dev (2002) investigates the extent of pro-poor growth by assessing various quantitative and qualitative aspects of the employment that has been generated, specifically, employment elasticities of growth, labour productivity and wage rates, job security (casualisation and multiplicity) and access for the period of 1980 to 2000. He finds that the quality of employment has declined in all three economic sectors, and particularly in agriculture, and that the acutely affected are women. Poorer groups are predominantly reliant on casual labour for sustenance. The rate of growth in employment has been positive over time but it declined between 1994 and 2000.

³ For an overview of the various approaches to defining “pro-poor growth” see Ravallion (2004)

For measuring pro-poorness a cross-sectional study by Balasubramanian and Ravindran (2012) of women beneficiaries under the Muthulakshmi Reddy Maternity Benefit Scheme in five districts of Tamil Nadu showed that scheduled caste and landless women in the sample were disadvantaged in receiving benefits. Overall, only one-fourth of the women who delivered first or second order births in the sample received monetary assistance under the scheme.

Ravallion (2000) finds a number of conditions that determine how much India's poor share in economic growth. He suggested that without higher and more stable agricultural growth, it will be hard to restore India's momentum in poverty reduction. Agriculture, infrastructure and social spending (especially in lagging rural areas) will have to be prioritized first so as to enable the poor to participate fully in India's post-reform economic growth. The gains to the poor from non-agricultural growth have varied greatly across states, reflecting the contours of past attainments in human and physical resource development, especially in rural areas.

Ravallion and Datt (1999) using data from 20 household surveys for India's 15 major states for the period of 1960-94, study how initial conditions and sectoral composition of economic growth tend to determine the degree of economic growth and reduction in poverty. They find that states which initially had lower farm productivity, lower rural living standards relative to those in urban areas, and lower literacy experienced a less pro-poor growth process later. But the elasticities of poverty to (urban and rural) nonfarm output varied appreciably, and the differences were quantitatively important to the overall rate of poverty reduction.

The insight provided by the above review of studies clearly indicate that the measurement of pro-poor growth in the context to urban economic growth is highly neglected field of research, and therefore this paper attempt to empirically asses the urban pro-poor growth in context to India.

3. Theoretical framework

3.1 The pro-poor growth

For the measurement of pro-poor growth, this study follows the theoretical framework proposed by Duclos (2009) and Araar et al., (2007, 2009).⁴ Absolute pro-poorness refers to a situation

⁴ We have tried to present the basic theoretical structure and equations which are essential for the empirical analysis and as they are presented in Araar (2012). The details are given in Duclos (2009), Araar et al., (2007, 2009) and Araar (2012).

where incomes of the poor grow by an absolute amount that is no less than some norm (often set to zero). Relative pro-pooriness requires the increase in the incomes of the poor to be greater than some norm (often mean income growth).⁵

For measuring pro-poor growth, the framework of Duclos (2009) has proposed following two important dimensions: (1) a poverty line to separate the poor from non-poor, and (2) a set of normative weights to differentiate among the poor. The framework as developed by Duclos (2009) is described below.

Let $\mathbf{y}_1 = (y_1^1, y_2^1, \dots, y_{n_1}^1) \in \mathfrak{R}_+^{n_1}$ be a vector of non-negative initial incomes (or consumption, wealth, or any other welfare indicator of interest) at time 1 of size n_1 , and let $\mathbf{y}_2 = (y_1^2, y_2^2, \dots, y_{n_2}^2)$ be an analogous vector of incomes at time 2 of size n_2 .

In case of relative standard, which is simply the average growth rate, denoted by g . Let $W(\mathbf{y}_1, \mathbf{y}_2, g, z)$ be the pro-poor evaluation function that we want to use, where $z > 0$ stands as the poverty line. It is defined as the difference between two evaluation functions $\pi(\mathbf{y}_1, z)$ and $\pi^*(\mathbf{y}_2, g, z)$, each for time 1 and time 2, respectively, and which are analogous to poverty indices for each of the two time periods:

$$W(\mathbf{y}_1, \mathbf{y}_2, g, z) \equiv \pi^*(\mathbf{y}_2, g, z) - \pi(\mathbf{y}_1, z) \quad \dots\dots\dots (1)$$

The change from \mathbf{y}_1 to \mathbf{y}_2 will be deemed pro-poor if $W(\mathbf{y}_1, \mathbf{y}_2, g, z) \leq 0$.

The social welfare function of W has the following basic axioms. 1) *focus axiom*, 2) *population invariance axiom*, 3) *anonymity axiom*, 4) *normalization axiom*, 5) *monotonicity axiom*, 6) *distribution sensitivity axiom*.

3.1.1 Relative pro-poor judgments

Let $F_j(y)$ be the distribution function of distribution j . Also define as $Q_j(p)$ the quantile function for the distribution F_j . This is formally defined as $Q_j(p) = \inf\{s \geq 0 | F_j(s) \geq p\}$ for $p \in [0,1]$. With a continuous distribution and a strictly positive income density, $Q(p)$ is simply the inverse of the distribution function, and therefore is the income of the individual at rank p in the distribution. Then the FGT indices are given by:

$$P_j(z; \alpha) = \int_0^{F_j(z)} \left(1 - \frac{Q_j(p)}{z}\right)^\alpha dp. \quad \dots\dots\dots (2)$$

⁵ See Araar (2012) for the detailed discussion.

$P_j(z; \alpha = 0)$ is the headcount index (and the distribution function) at z , and $P_j(z; \alpha = 1)$ is the average poverty gap.

A movement from y_1 to y_2 will be judged as pro-poor by all such functions if and only if

$$P_2((1+g)z; \alpha = 0) \leq P_1(z; \alpha = 0) \text{ for all } z \in [0, z^+] \quad \text{----- (3)}$$

A distributional change that satisfies (3) is called first-order relatively pro-poor since all pro-poor evaluation functions within $\Omega^1(g, z^+)$ will find that it is pro-poor, and this, for any choice of poverty line within $[0, z^+]$ and any W that obeys the above defines axioms. Verifying (3) simply involves checking whether—over the range of poverty lines $[0, z^+]$ the headcount index in the initial distribution is larger than the headcount index in the posterior distribution when that distribution is normalized by $1+g$. An alternative and equivalent way of checking whether a distributional change can be declared first-order relatively pro-poor is to compare the ratio of the quantiles and $(1+g)$, or, if g is growth in mean income, to compare the growth in quantiles to the growth in the mean. That is, we check whether, for all $p \in [0, F_1(z^+)]$,

$$\text{an-GIC}(p) = \frac{Q_2(p) - Q_1(p)}{Q_1(p)} \geq g. \quad \text{----- (4)}$$

Using (4) is equivalent to Ravallion and Chen's (2003) suggestion to use “growth incidence curves” to check whether growth is pro-poor. These curves show the growth rates of living standards at different ranks in the population.

The class $\Omega^2(g, z^+)$ is a sub set of $\Omega^1(g, z^+)$ and where the evaluation function obeys to the distribution sensitivity axiom (sensitive to the situation of the poorer group). First-order pro-poor judgements can be demanding in expansion periods. A movement from y_1 to y_2 will be judged pro-poor by all pro-poor evaluations

Function $\Omega^2(g, z^+)$ if and only if

$$P_2((1+g)z; \alpha = 1) \leq P_1(z; \alpha = 1) \text{ for all } z \in [0, z^+] \quad \text{----- (5)}$$

Verifying (5) simply involves checking whether the average poverty gap in the initial distribution is larger than that in the posterior distribution when that distribution is normalized by $(1+g)$ and this, over the range of poverty lines $[0, z^+]$. An alternative way of checking condition is by using the Generalized Lorenz curve. A distributional change is second-order relatively pro-poor if for all $p \in [0, F_2(1+g)z^+]$.

$$\lambda(p) \equiv \frac{c_2(p)}{c_1(p)} \geq 1 + g. \text{ ----- (6)}$$

Expression (6) involves computing the growth rates in the cumulative incomes of proportions p of the poorest, and to compare those growth rates to g . For $1 + g$ equal to the ratio of mean income, condition (6) is equivalent to checking whether the Lorenz curve for \mathbf{y}_2 is above that of \mathbf{y}_1 for the range of $p \in [0, F_2(1 + g) z^+]$.

3.1.2 Absolute pro-poor judgments

Absolute pro-poorness can be confirmed by comparing the absolute change in the income of the poor to some standard, denoted by a and usually set to zero. The axiom of *absolute* pro-poorness essentially says that π^* should be “translation invariant” in \mathbf{y} and a i.e., that the evaluation with respect to pro-poorness should be neutral whenever the absolute gains of the poor are the same as the standard a . This reference point is consistent with the view that a change is good for the poor if it increases the poor’s absolute living standards (*e.g.*, Ravallion and Chen, 2003).

Hence, the absolute axiom requires that if $\mathbf{y} + a = \mathbf{y}'$, then $W(\mathbf{y}, \mathbf{y}', a, z) = 0$.

This allows us to formally define the class of first-order absolute pro-poor evaluation functions $\tilde{\Omega}^1(g, z^+)$ as being comprised of all functions $W(\cdot, \cdot, a, z)$ that satisfy the focus, population, anonymity, monotonicity, normalization and absolute axioms, and for which $z \leq z^+$. We will later set a to zero in the empirical section of this paper. It can then be shown that a movement from \mathbf{y}_1 to \mathbf{y}_2 is deemed to be first-order absolutely pro-poor (that is, pro-poor by all evaluation functions $W(\cdot, \cdot, a, z)$ that are members of $\tilde{\Omega}^1(g, z^+)$ if and only if

$$P_2(z + \alpha; \alpha = 0) \leq P_1(z; \alpha = 0) \text{ for all } z \in [0, z^+] \text{ ----- (7)}$$

An equivalent way of checking whether a distributional change can be declared to be first-order absolutely pro-poor is to compare the absolute change in the values of the quantiles for all $p \in [0, F_1(z^+)]$:

$$Q_2(p) - Q_1(p) \geq a. \text{ ----- (8)}$$

A similar condition holds when evaluating absolute second-order pro-poorness. These evaluations are based on the $\tilde{\Omega}^2(a, z^+)$ class of indices, which is defined similarly to $\tilde{\Omega}^1(a, z^+)$

but with the additional requirement of distribution sensitivity. A movement from y_1 to y_2 is then said to be second-order absolutely pro-poor if and only if

$$(z + a)P_2((z + a; \alpha = 1) \leq zP_1(z; \alpha = 1) \text{ for all } z \in [0, z^+]. \dots\dots\dots (9)$$

A sufficient condition for (9) is then to verify whether, for all $p \in [0, F_2(z^+ + a)]$, the change in the average income of the bottom p proportion of the population is larger than α :

$$\frac{C_2(p) - C_1(p)}{p} \geq \alpha. \dots\dots\dots (10)$$

5. Data used

Due to non-availability of income data at the individual level, urban monthly per capita consumer expenditure (MPCE) data from 50th round for 1993-94, 61st round for 2004-05, and 66th round for 2009-10 are used.^{6, 7} Therefore, we consider the per capita consumption expenditure is the monetary indicator of wellbeing. The 55th Round for 1999-00 onwards consumption expenditure survey follows both Uniform Recall Period (URP) and Mixed Recall Period (MRP).⁸ To ensure comparison with the other rounds, we have uses information on consumption expenditure based on uniform 30-day recall period (i.e., URP) for all items of consumption. National Sample Survey follows stratified and multi-staged sampling method with the final sampling units being households and all their members.

Table 1 shows estimates of all-India urban average MPCE_{URP} from three quinquennial surveys of consumer expenditure. All consumption expenditures are expressed at 1984-85 prices. For urban India, real MPCE (measured using a price deflator with base 1987-88) is seen to have grown

⁶ Less known limited individual level income data are available from National Council of Applied Economic Research (NCAER). See for more details following link: <http://www.ncaer.org/NSHIE-Data-Documentation.pdf>.

⁷ In post-reform India four quinquennial rounds data on MPCE are available from National Sample Survey Organization (NSSO). However, 55th round for 1999-2000 cannot be compared with other rounds due to methodological (recall periods) differences followed in the survey. For more details see the following links: http://mospi.nic.in/Mospi_New/upload/seminar_61R.pdf.

⁸ Until 1993-94, information on consumption expenditure collected by National Sample Survey Organisation was based on a uniform 30-day recall period for all items of consumption. Since 1999-00, NSSO has used a mixed recall period for collecting information on consumption expenditure from households. The Uniform Recall Period (URP) refers to consumption expenditure data collected using the 30-day recall or reference period. The Mixed Recall Period (MRP) refers to consumption expenditure data collected using the one-year recall period for five non-food items (i.e., clothing, footwear, durable goods, education and institutional medical expenses) and 30-day recall period for the rest of items.

from Rs. 264.92 in 1993-94 to Rs.355.03 in 2009-10.⁹ The growth in urban MPCE over the 16-year period since 1993-94 has been about 34%. On the other hand, poverty head count ratio (or Gini coefficient) has declined (or increased) from 31.8 per cent (or 0.34) in 1993-94 to 20.9 per cent (or 0.39) in 2009-10.

Table 1: Growth in MPCE_{URP} at current and constant prices since 193-94 to 2009-10, all-India Urban

Year	Average MPCE _{URP} (Rs.)	Price deflator for urban sector #	Average MPCE _{URP} Urban (Rs.): base 1987-88	Sample size (Persons)	Poverty head count ratio @	Gini Coefficient
1993-94	458	173	264.76	208248	31.8	0.34
2004-05	1052	338	311.35	206529	25.7	0.38
2009-10	1786	503	355.03	181412	20.9	0.39

derived from Consumer Price Index (CPI) for urban non-manual employees with base 1984-85 = 100

@ These poverty estimates are calculated following the new poverty lines as worked out by the Expert Group, which was set up by the Planning Commission of India in 2009 under the Chairmanship of Prof. Suresh Tendulkar which uses MPCE based on mixed reference period (MRP). The urban poverty lines as per the Tendulkar methodology were Rs. 578.8 and Rs. 859.6 in 2004-05 and 2009-10, respectively.

6. Empirical Results

The entire empirical analysis is done using the DASP software package (Araar and Duclos, 2007) for Stata. We start our investigation by considering the evolution of the density of MPCE in Figure 1. The distribution of MPCE worsened between 1993-94 and 2004-05 as evidenced by the shift of the density curves to the left. It however exhibited a quick recovery between 2004-05 and 2009-10, as shown by the shift of the density curve to the right. The estimates of Lorenz curves and Gini coefficient presented in Figure 2 and Table 1, suggest that inequality has increased from 1993-94 to 2009-10. Figures 3 and 4 and the results of Table 1 suggest that absolute poverty, as measured by the headcount and poverty gap indices, had decreased between 1993-94 to 2009-10.

The statistical testing for first-order absolute pro-pooriness of urban India's growth can be done using the information presented in Figure 5 to 10.

The top line of Figure 5 shows the sample estimates of

$$\Delta^1(z) = P_{2004-05}(z; \alpha = 0) - P_{1993-94}(z; \alpha = 0) \quad \text{-----} \quad (11)$$

⁹ Price deflators are reported in the NSSO report entitled "Key Indicators of Household Consumer Expenditure in India, 2009-10" available from the following web address; http://mospi.nic.in/Mospi_New/upload/Key_Indicators-HCE_66th_Rd-Report.pdf

for the difference between 2004-05 and 1993-94, whereas the dotted bottom curve is the lower bound of the one sided confidence interval,

$$\Delta^1(z) - \sigma \hat{\Delta}^s(z)^{\zeta(\theta)} \dots\dots\dots (12)$$

Since $\Delta^1(z) - \sigma \hat{\Delta}^s(z)^{\zeta(\theta)} < 0$ is verified on Figure 5 mostly for all reasonable poverty lines, we can infer that growth was absolutely pro-poor during the period 1993-94 to 2004-05. It is important to note here that urban poverty line estimated by the Tendulkar methodology (GOI, 2009) was Rs. 578.8 in 2004-05.¹⁰ In all reasonable poverty lines above Rs. 578.8, $\Delta^1(z) - \sigma \hat{\Delta}^s(z)^{\zeta(\theta)} < 0$, i.e., growth was absolutely pro-poor during the period 1993-94 to 2004-05.

The sample estimates of the difference in quantiles between 1993-94 and 2004-05 is shown by the solid line curve, and the upper bound of a one-sided confidence interval is shown by dashed curve. As we can see from Figure 6 that $\Delta^1(p) - \sigma \hat{\Delta}^s(z)^{\zeta(\theta)} > 0$ for percentiles p between 0.60 and 0.90, we can conclude from our data that growth was absolutely pro-poor during the period 1993-94 and 2004-05.

Similar results are obtained by comparing the situation in 2004-05 and 2009-10. Judging from Figures 7 and 8, the change in distribution was first-order absolutely pro-poor. The upper bound of the confidence interval for $\Delta^1(z)$ is everywhere negative, whatever reasonable poverty line is selected, and the lower bound of the confidence interval for $\Delta^1(p)$ is everywhere positive, whatever reasonable percentile is selected.

Given the results as reported above, we proceeded to check for pro-poorness over the entire period 1993-94 to 2009-10. This was done using Figures 9 and 10. The distributive change was almost certainly first-order absolutely pro-poor. The lower bound of the confidence interval for $P_{2009-10}(z; \alpha = 0) - P_{1993-94}(z; \alpha = 0)$ is everywhere negative, again whatever reasonable poverty line was selected, (urban poverty line estimated by the Tendulkar methodology (GOI, 2012) was Rs. 859.6 in 2009-10) and the lower bound of the confidence interval for the

¹⁰ Tendulkar's committee recommended methodology for poverty estimation is now a controversial issue in India and Govt. of India has set up a Technical Group (Planning Commission Press Release on 24 May, 2012) to revisit the methodology for estimation of poverty and identification of the poor under the chairmanship of Dr C Rangarajan, which is now on going.

difference in quantiles, $Q_{2009-10}(p) - Q_{1993-94}(p)$, is everywhere positive. Thus, it can be inferred that the entire period of 1993-94 to 2009-10 was overall first-order absolutely pro-poor.

Given the robust results obtained for first-order pro-poorness, it is not necessary to test for second-order pro-poorness since first order pro-poorness implies second-order pro-poorness. This can be seen by noting that

$$P_j(z; \alpha = 1) = \int_0^z P_j(y; \alpha = 0) dy. \text{ ----- (13)}$$

If first-order pro-poorness is seen at order 1, then by equation (13) second-order pro-poorness also obtains. The same relation is confirmed by noting from equations (6), (8) and (10) that the Generalized Lorenz curve is implied by the quantile condition.

Testing for relative pro-poorness can be done using Figures 11 to 19. Figure 11 shows that the sample estimates of $P_{2004-05}((1+g)z; \alpha = 0) - P_{1993-94}(z; \alpha = 0)$ of distributive movement during the period of 1993-94 to 2004-05 was not first-order relatively pro-poor since the difference is not always negative in the samples observed. Also the confidence interval around the sample estimates makes it clear (Figure 11) that the observed differences $P_{2004-05}((1+g)z; \alpha = 0) - P_{1993-94}(z; \alpha = 0)$ are not statistically significant over a wide range of bottom poverty lines – the upper bounds of the one-sided confidence intervals extended above zero line for z up to around 300 (or between 550 and 1100) rupees and p up to around 0.34. Hence, at a conventional level 95 per cent of statistical, the first-order relative pro-poor condition is not satisfied. An analogous result is obtained (Figure 12) from comparing growth in quantiles to growth in average MPCE. Again, for a substantial range of percentiles, the one-sided confidence interval lays below zero line.

This was also the case for the second order of dominance, as shown in Figure 13. However, It might seem that second-order relative pro-poorness over the period from 1993-94 to 2004-05 certainly cannot be weaker than first-order relative pro-poorness over the same period. This is because it follows from the fact that statistical uncertainty for first-order comparisons at the bottom of the distributions builds up at the second-order since second-order conditions are made of cumulative of first-order statistics. But if one takes into account the effect of sampling variability

at the bottom of the distribution, than the evidence for second-order relative pro-pooriness is statistically weaker than that for first-order relative pro-pooriness (Araar, 2007).

Testing of first-order relative pro-pooriness for the period of 2004-05 to 2009-10 is done using Figures 14 and 15. The confidence interval around the sample estimates of $P_{2009-10}((1+g)z; \alpha = 0) - P_{2004-05}(z; \alpha = 0)$ in Figure 14 is below zero only for z after around Rs. 500, which leads to infer that, not very robust first-order relative pro-pooriness change was evident during that period. A similar result is obtained in Figure 15 from comparing growth in quantiles to growth in average MPCE. For a range of percentiles from 0.28 to 0.7, the lower bound of the confidence interval lies above the zero line.

Given the above results, it would be interesting to test for second order relative pro-pooriness between 2004-05 and 2009-10. The result is shown in Figure 16. We now get even stronger (and very strong) evidence of anti relative pro-pooriness in that period as the confidence interval is always below zero for differences in $C_{2009-10}(p)/C_{2004-05}(p) - \mu_{2009-10}/\mu_{2004-05}$. As discussed above, if first-order pro-pooriness can be verified statistically at order 1, then we can expect second-order pro-pooriness also to be inferred statistically.

The results of the tests for first order relative pro-pooriness over the period 1993-94 to 2009-10 are presented in Figures 17 and 18. The confidence interval around the sample estimates of $P_{2009-10}((1+g)z; \alpha = 0) - P_{1993-94}(z; \alpha = 0)$ in Figure 17 is not always below zero, but positive between the ranges of Rs. 500 and 1000. The same evidence is confirmed by Figure 18 from the comparison of growth in quantiles to growth in average MPCE between 1993-94 and 2009-10. The low bound of the confidence interval is above the zero line for a range of percentiles from 0.5 to 0.9. Hence, the incidence of statistically anti relative pro-pooriness change in the period 1993-94 to 2009-10 is confirmed by evidence. The robust result of anti relative pro-pooriness is obtained from testing the second order relative pro-pooriness, as the confidence interval is always below zero as seen in Figure 19.

7. Conclusions and policy implications

This paper is devoted to the assessment of pro-pooriness of urban economic growth in post reform India, i.e., for the period of 1993-94 to 2009-10. This paper uses the methodology

developed by Duclos (2004) and Araar et al. (2007, 2009). Statistical techniques are used to derive the sampling distribution of the various estimators and the confidence intervals around the curves are ranked to conclude whether the change has been robustly pro-poor –or anti-poor.

Due to unavailability of per capita income data, monthly per capita consumer expenditure (MPCE) data has been used for the study. The statistical exercises are done using the three rounds of quinquennial household survey data collected by NSSO in 1993-94, 2004-05, and 2009-10, respectively. The empirical results suggest that India's urban economic growth has been absolutely pro-poor but relatively anti-poor between 1993-94 and 2004-05, between 2004-05 and 2009-10, and between 1993-94 and 2009-10.

The paper argues that there is need for immediate government intervention for the reduction of effective urban poverty. For this purpose, city specific policies are needed as different size (measured by population) of cities show different levels of poverty and inequality (Tripathi, 2013). Greater access to and better quality of education, job creation, skill development of the worker, access of better health, improvement of basic amenities (such as, water, electricity, roads, sanitation, and housing) are needed for the reduction of urban poverty and more equitable distribution of the benefits of urbanization and economic development. Above all, what is required is the political will to adopt meaningful steps to improve the conditions of the poor.

Figure1: Density functions

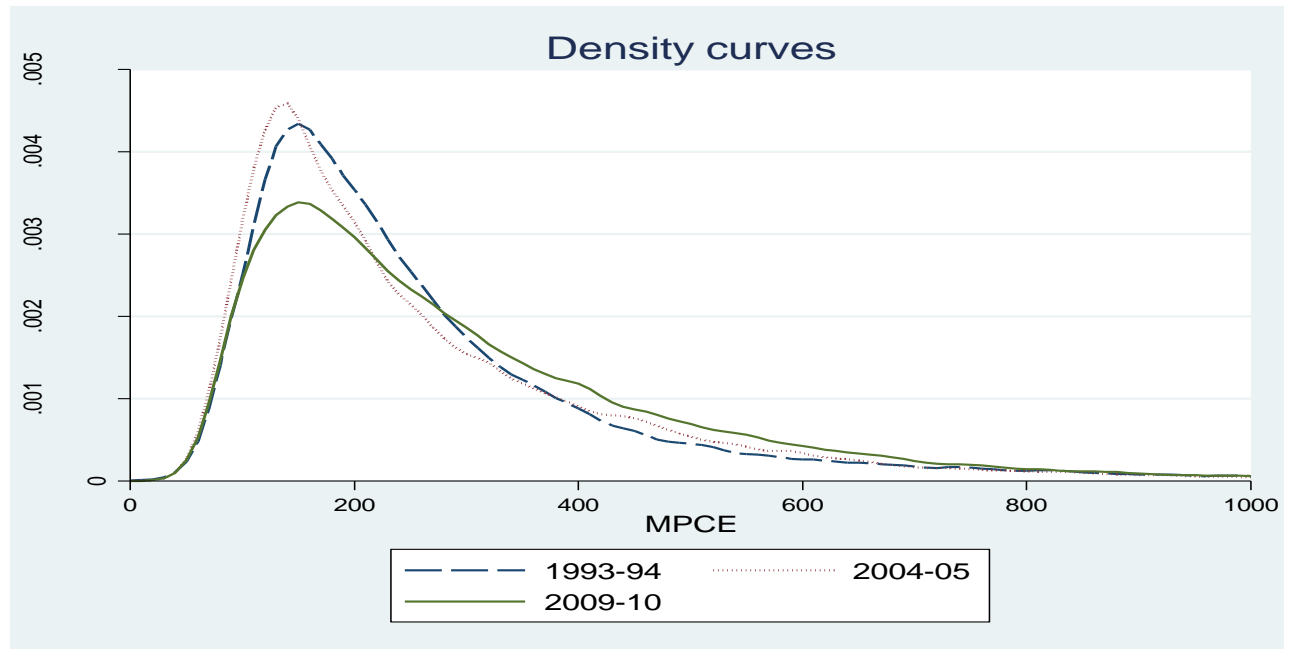


Figure 2: Lorenz curves

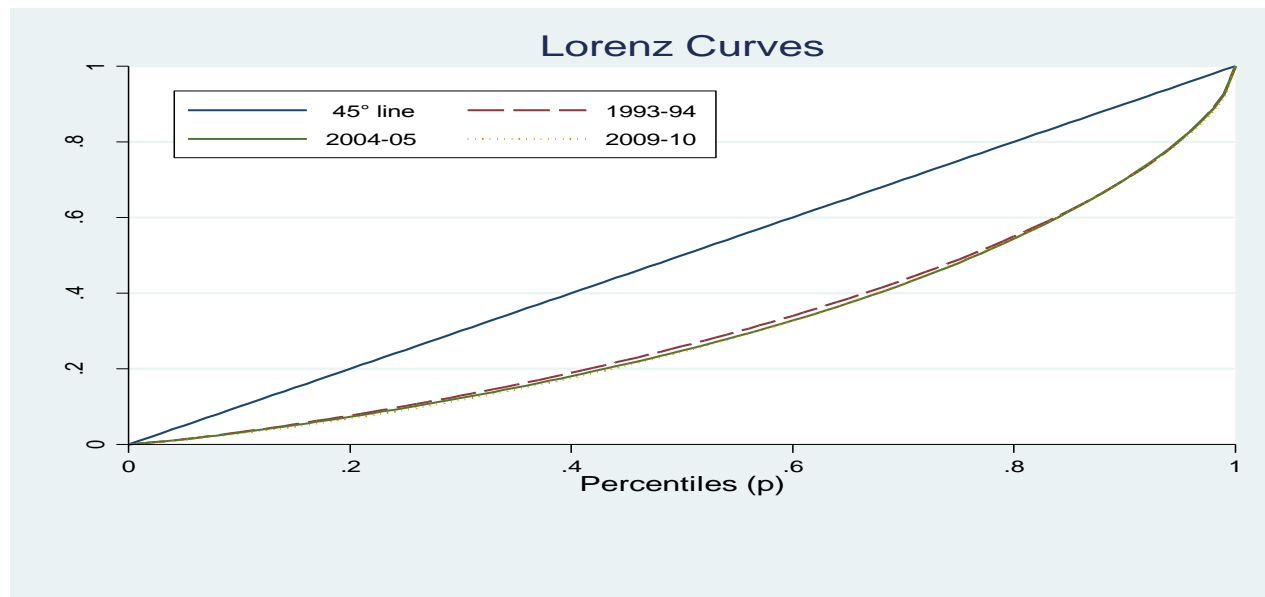


Figure 3: Poverty head count curves: $P(z; \alpha = 0)$ for a range of z

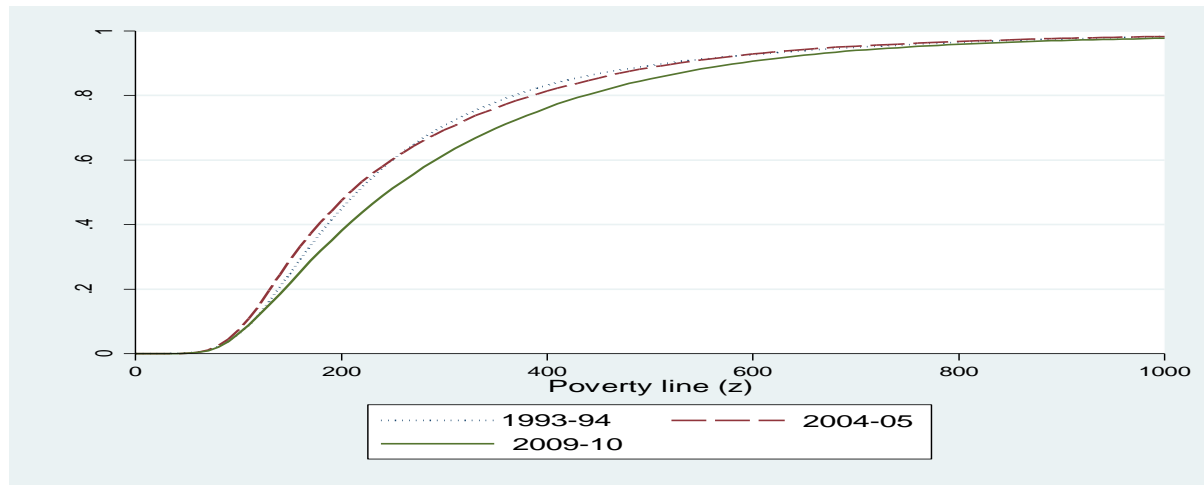


Figure 4: Poverty head count curves: $P(z; \alpha = 1)$ for a range of z

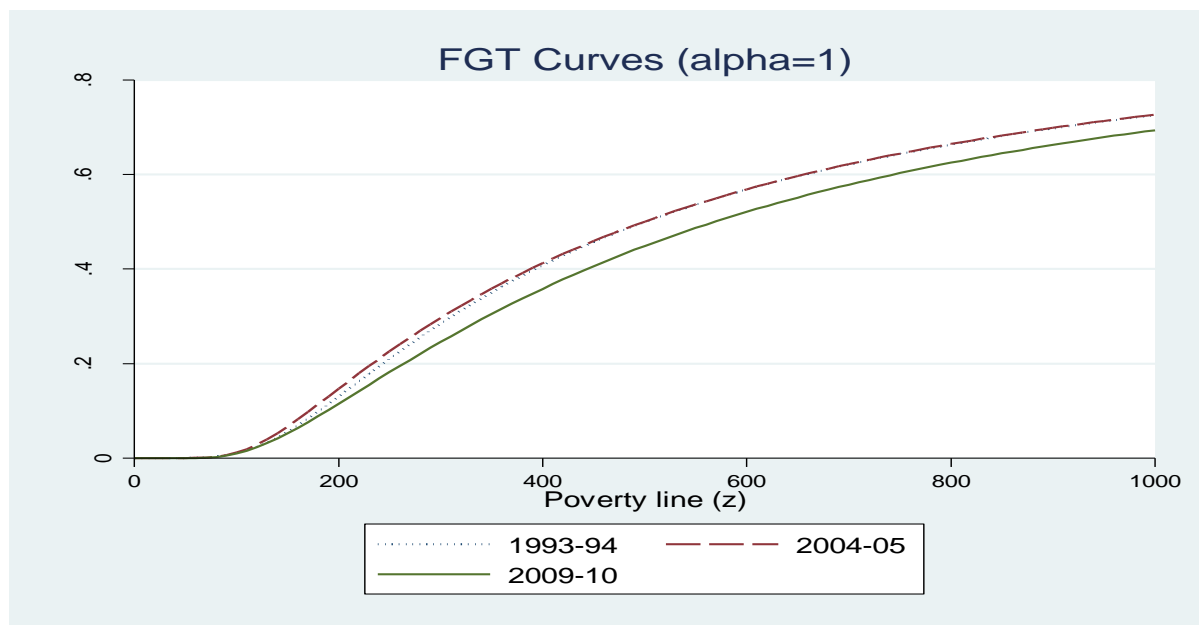


Figure 5: 1993-94 to 2004-05 is first-order absolutely pro-poor: $P_{2004-05}(z; \alpha = 0) - P_{1993-94}(z; \alpha = 0)$ is shown on the vertical axis

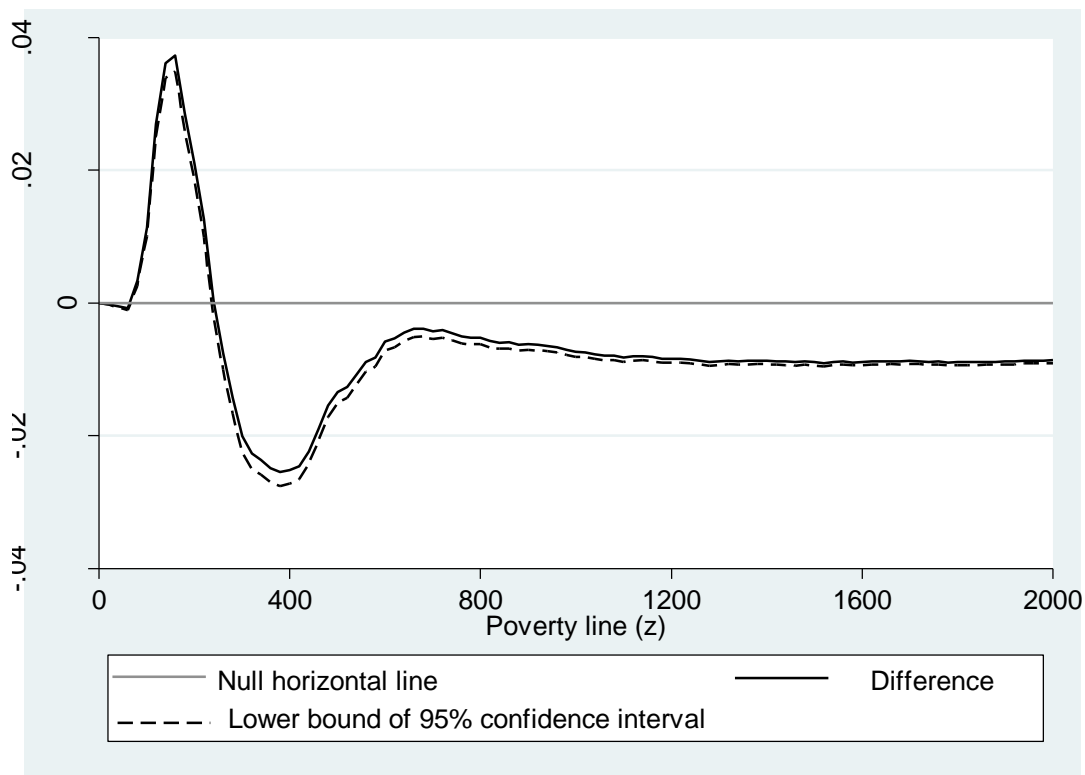


Figure 6: 1993-94 to 2004-05 is first-order absolutely pro-poor: $Q_{2004-05}(p) - Q_{1993-94}(p)$ is shown on the vertical axis

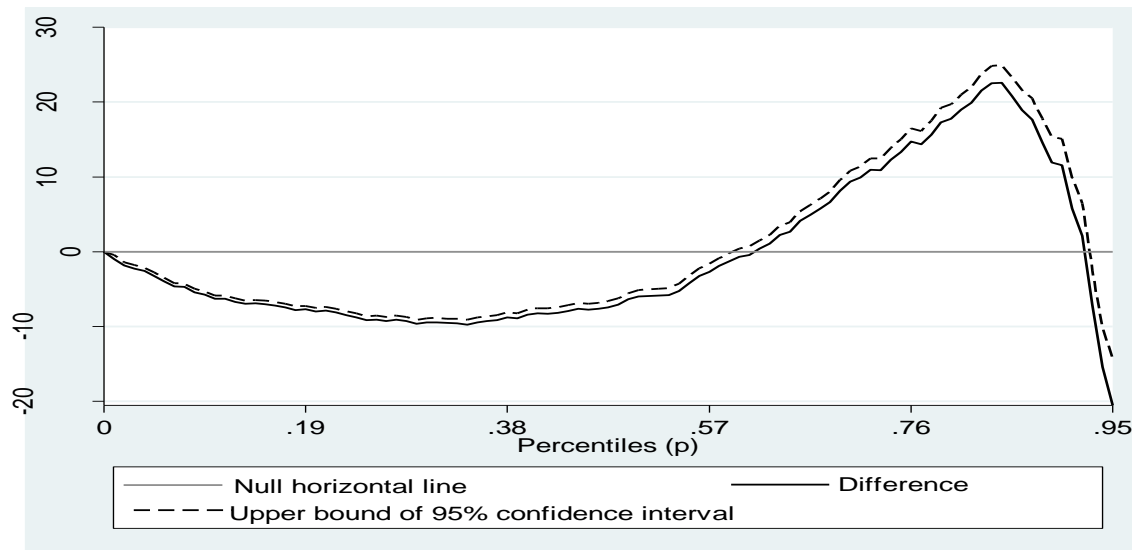


Figure 7: 2004-05 to 2009-10 is first-order absolutely pro-poor: $P_{2009-10}(z; \alpha = 0) - P_{2004-05}(z; \alpha = 0)$ is shown on the vertical axis

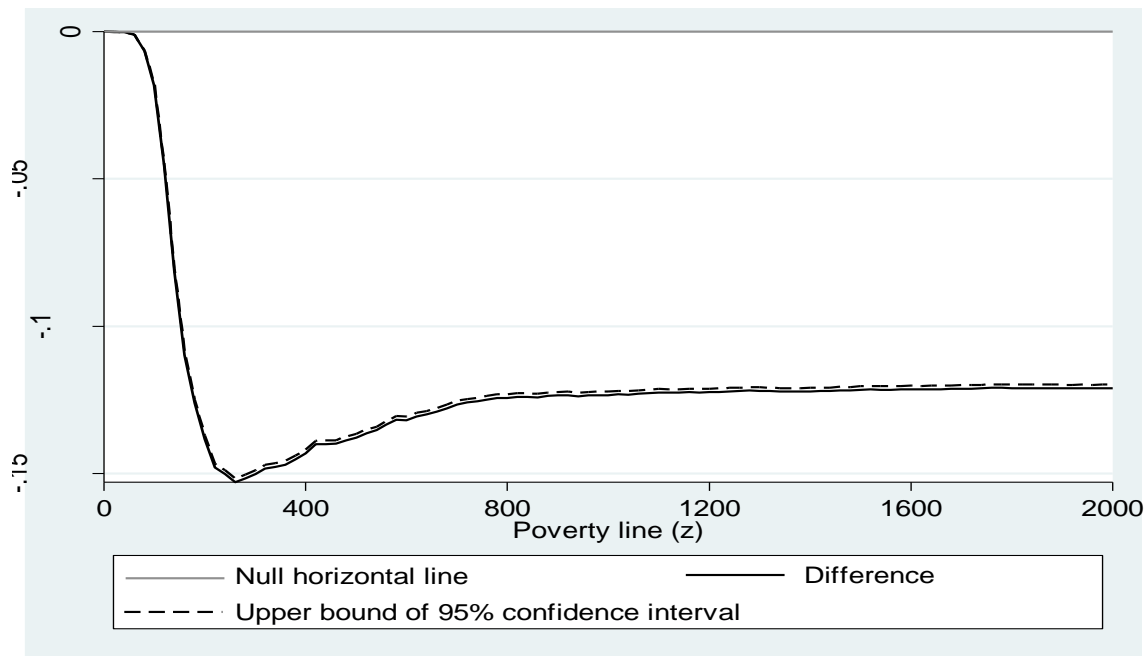


Figure 8: 2004-05 to 2009-10 is first-order absolutely pro-poor: $Q_{2009-10}(p) - Q_{2004-05}(p)$ is shown on the vertical axis

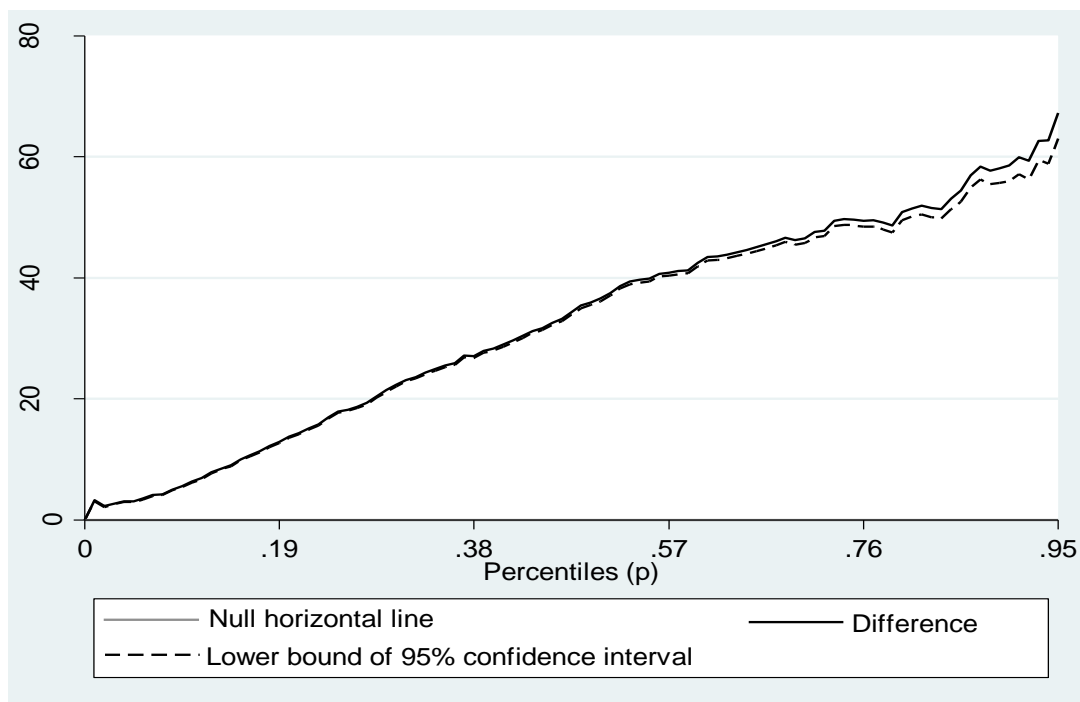


Figure 9: 1993-94 to 2009-10 is first-order absolutely pro-poor: $P_{2009-10}(z; \alpha = 0) - P_{1993-94}(z; \alpha = 0)$ is shown on the vertical axis

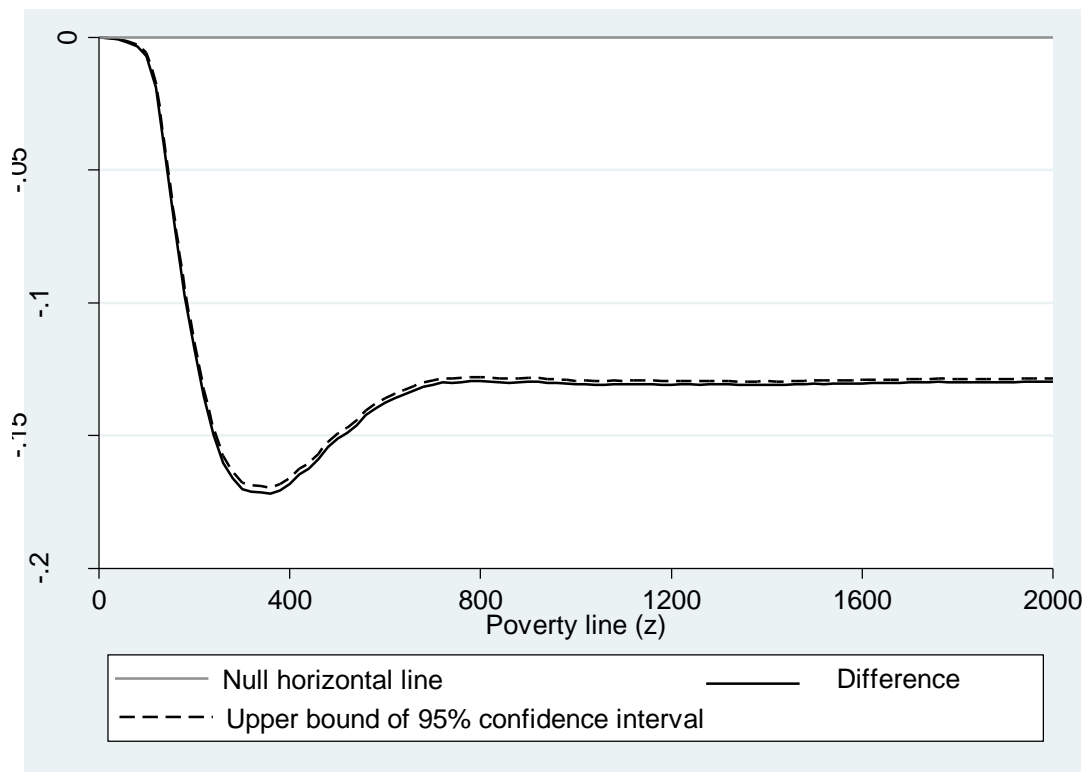


Figure 10: 1993-94 to 2009-10 is first-order absolutely pro-poor: $Q_{2009-10}(p) - Q_{1993-94}(p)$ is shown on the vertical axis

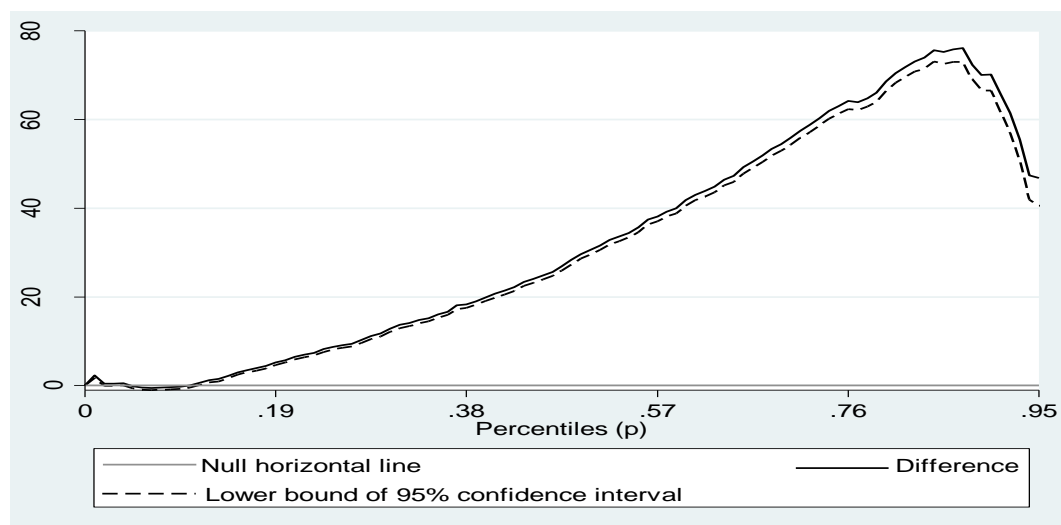


Figure 11: 1993-94 to 2004-05 is not statistically first-order relatively pro-poor:
 $P_{2004-05}((1+g)z; \alpha = 0) - P_{1993-94}(z; \alpha = 0)$ is shown on the vertical axis

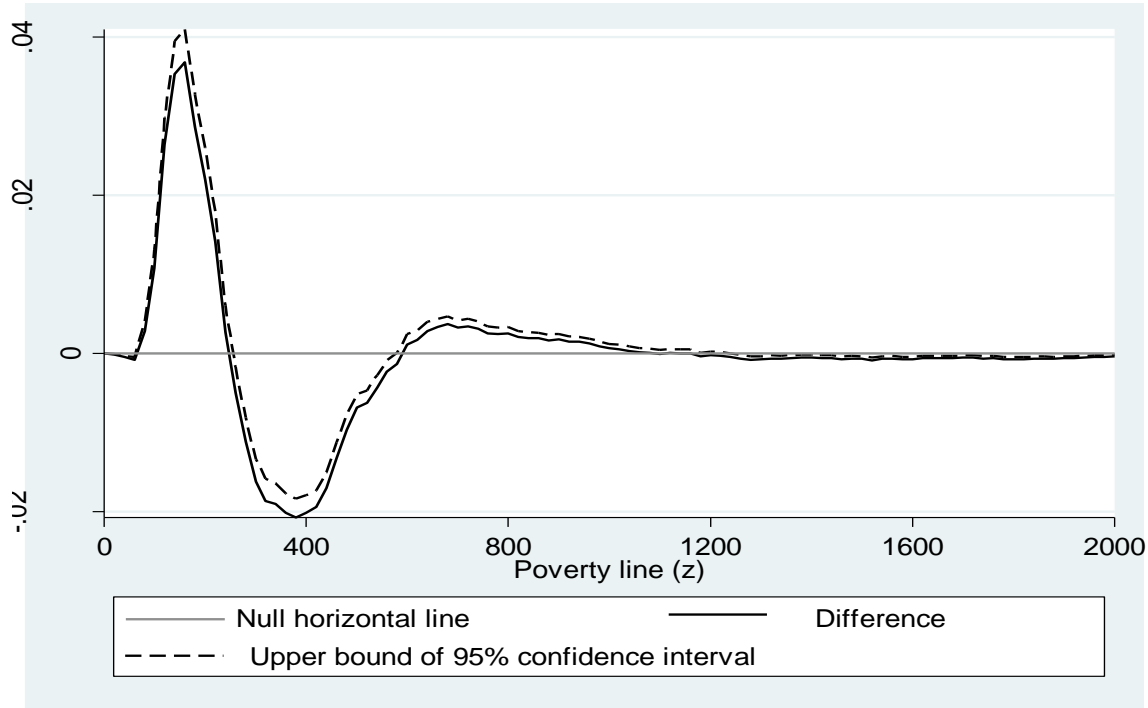


Figure 12: 1993-94 to 2004-05 is not statistically first-order relatively pro-poor:
 $Q_{2004-05}(p)/Q_{1993-94}(p) - \mu_{2004-05}(p)/\mu_{1993-94}(p)$ is shown on the vertical axis

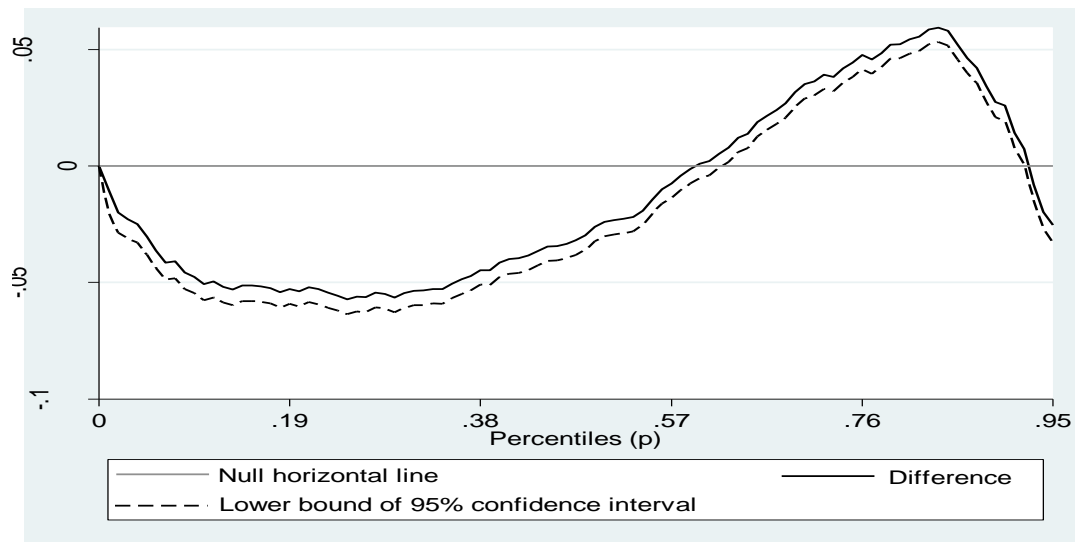


Figure 13: 1993-94 to 2004-05 is not statistically second-order relatively pro-poor: $C_{2004-05}(p)/C_{1993-94}(p) - \mu_{2004-05}/\mu_{1993-94}$ is shown on the vertical axis

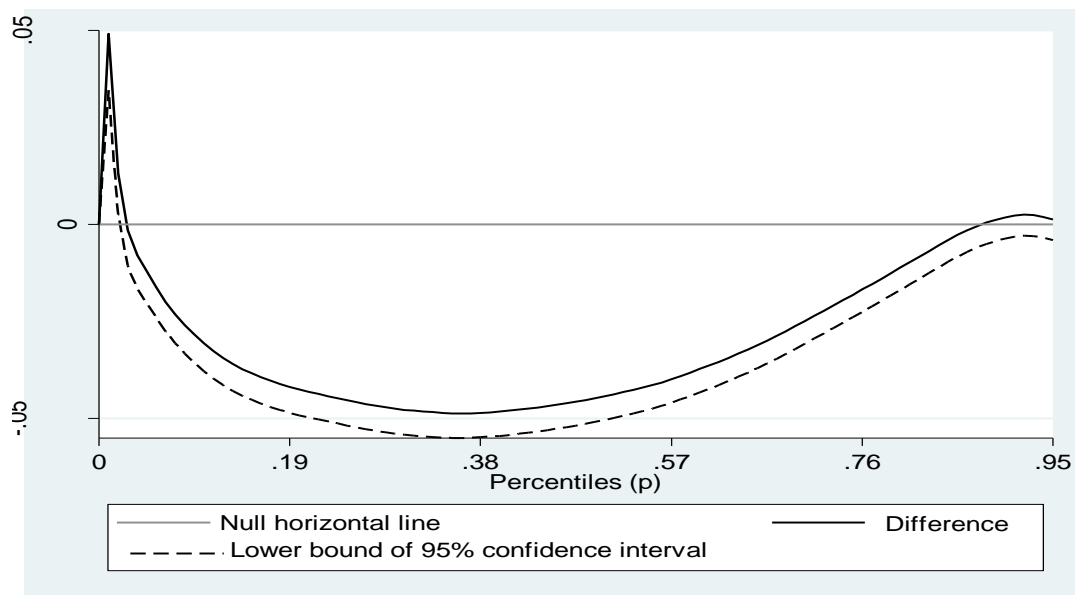


Figure14: 2004-05 to 2009-10 is first-order relatively pro-poor: $P_{2009-10}((1+g)z; \alpha = 0) - P_{2004-05}(z; \alpha = 0)$ is shown on the vertical axis

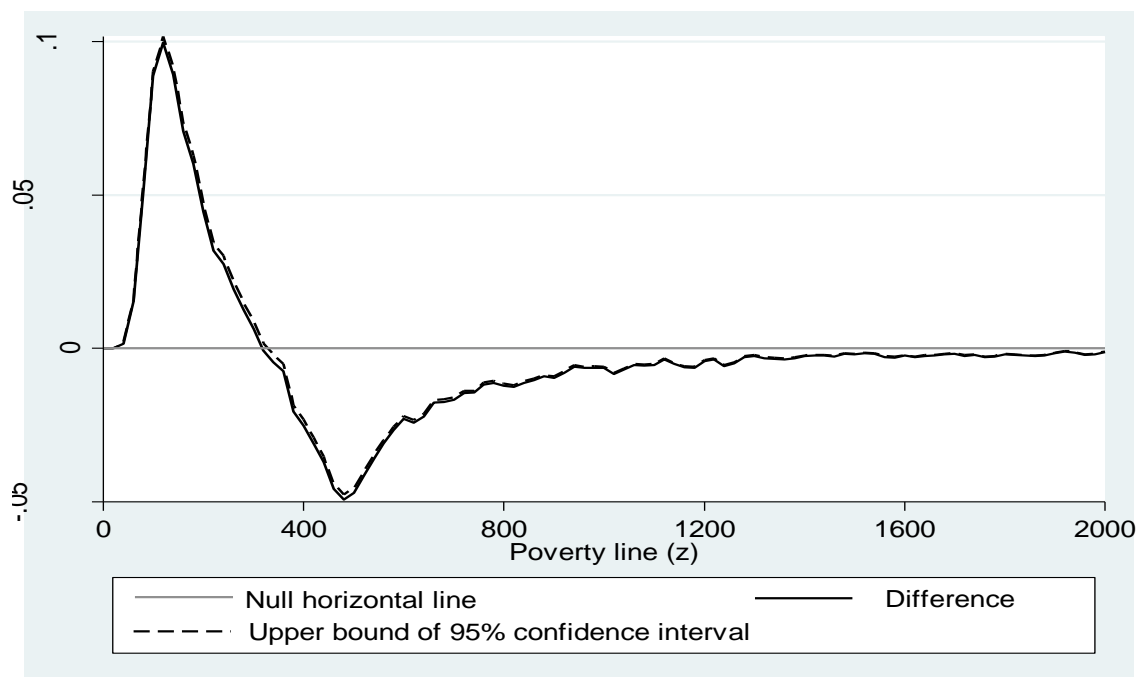


Figure 15: 2004-05 to 2009-10 is first-order relatively pro-poor: $Q_{2009-10}(p)/Q_{2004-05}(p) - \mu_{2009-10}(p)/\mu_{2004-05}(p)$ is shown on the vertical axis

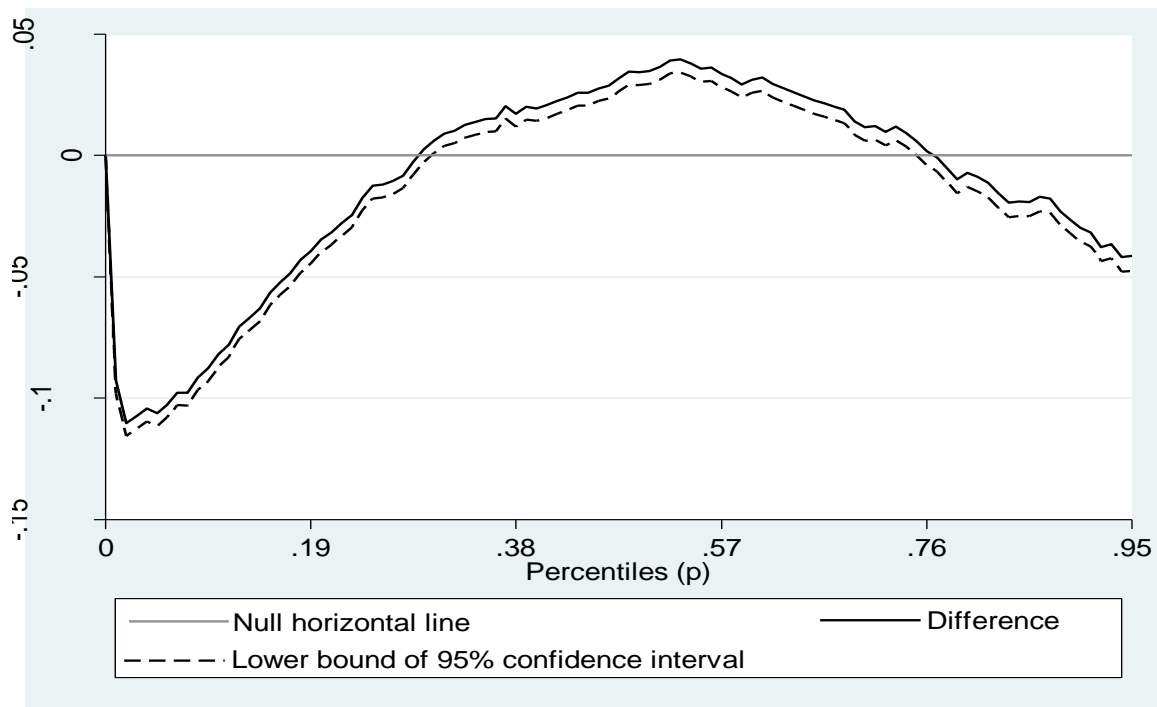


Figure 16: 2004-05 to 2009-10 is not second-order relatively pro-poor: $C_{2009-10}(p)/C_{2004-05}(p) - \mu_{2009-10}/\mu_{2004-05}$ is shown on the vertical axis

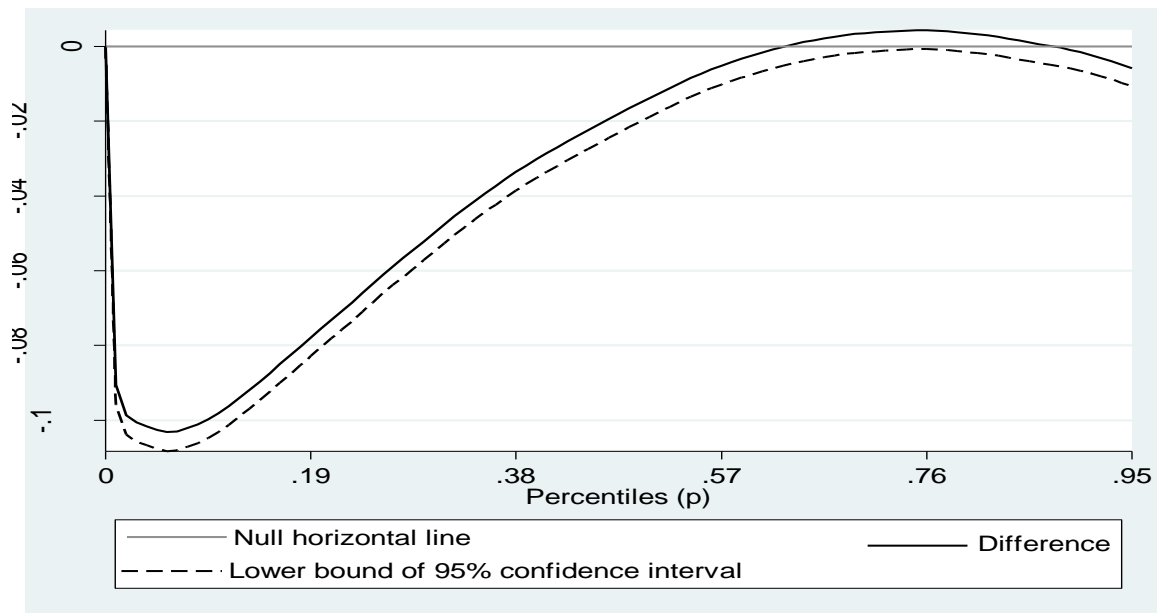


Figure 17: 1993-94 to 2009-10 is not first-order relatively pro-poor: $P_{2009-10}((1+g)z; \alpha = 0) - P_{1993-94}(z; \alpha = 0)$ is shown on the vertical axis

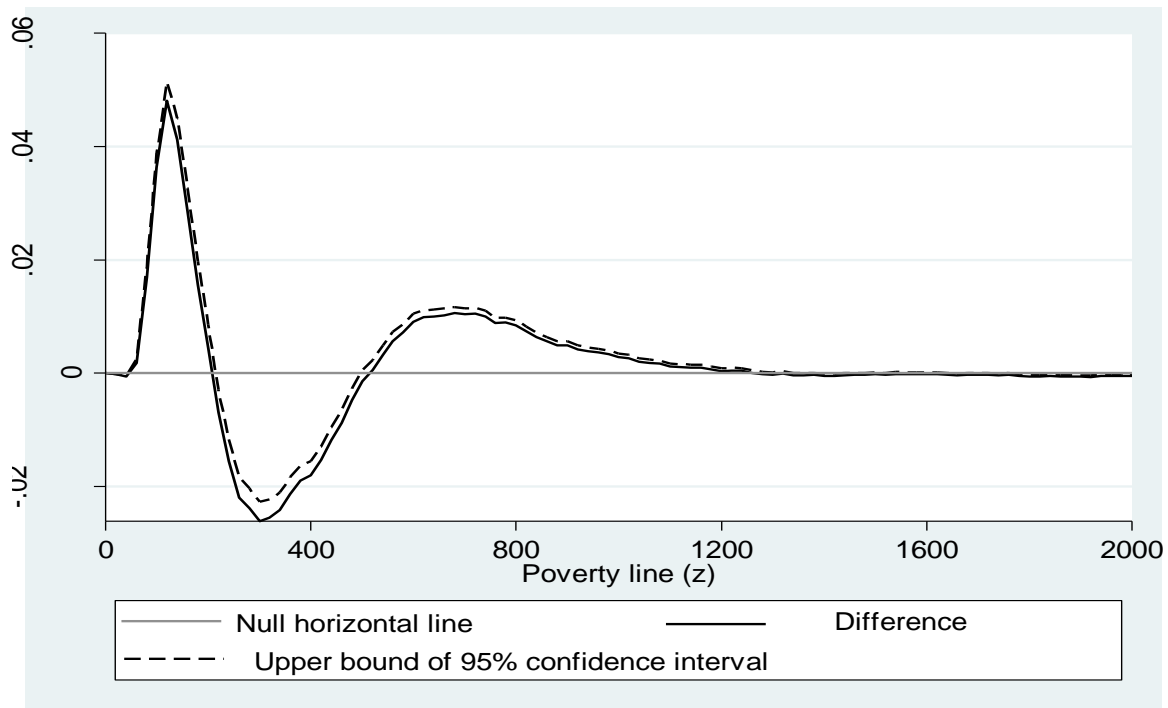


Figure 18: 1993-94 to 2009-10 is not first-order relatively pro-poor: $Q_{2004-05}(p)/Q_{1993-94}(p) - \mu_{2004-05}(p)/\mu_{1993-94}(p)$ is shown on the vertical axis

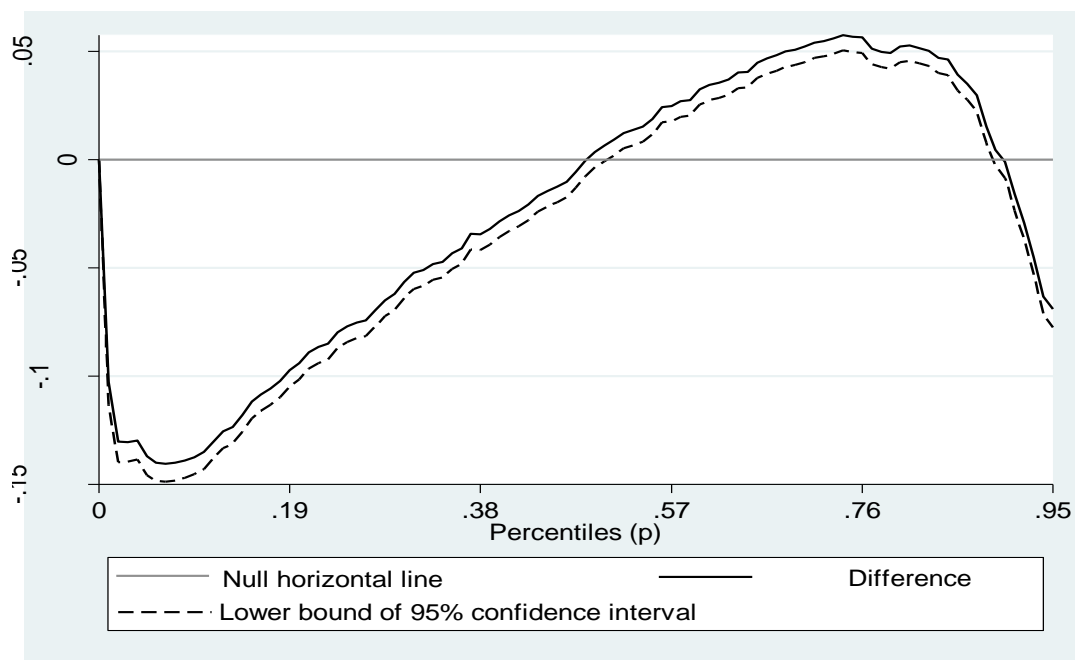
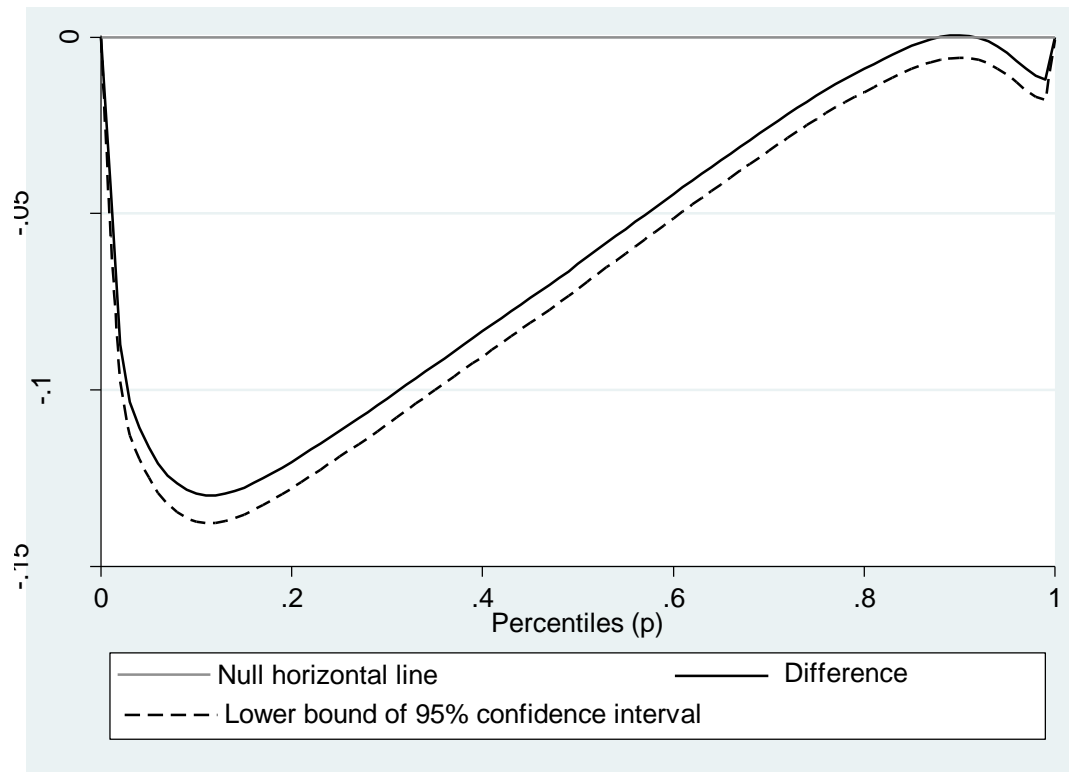


Figure 19: 1993-94 to 2009-10 is not second-order relatively pro-poor: $C_{2009-10}(p)/C_{1993-94}(p) - \mu_{2009-10}/\mu_{1993-94}$ is shown on the vertical axis



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